

Verified Translation

I, Gyu Shik SHIN, hereby declare the following:

I am knowledgeable in the Korean and English languages. I have reviewed Korean Application 18841/1993 and believe the attached document to be an accurate translation thereof.

All statements made herein of my own knowledge are true and all statements made on information and belief are believed to be true. Further, these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Date: January 2, 2002



Signature of Declarant

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Title of the invention		KARAOKE CD FORMAT AND DEVICE FOR CONTROLLING AUDIO SIGNAL UTILIZING THE SAME		
Pursuant to Art. 42 of the Patent Law, we apply as above.				
September 17, 1993				
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## SPECIFICATION

## 1. TITLE OF THE INVENTION

KARAOKE CD FORMAT AND DEVICE FOR CONTROLLING AUDIO SIGNAL  
UTILIZING THE SAME

## 2. BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a layout of a karaoke CD data.

Fig. 2 shows a conventional karaoke CD system.

Fig. 3 shows a conventional interleaving of MPEG audio/video  
sectors.

Fig. 4 shows an interleaving of MPEG audio/video sectors in  
accordance with this invention.

Fig. 5 is subheader in accordance with this invention.

Fig. 6 is a device for controlling karaoke CD audio signal  
in accordance with this invention.

Fig. 7 is an operational flow diagram of a device for  
controlling karaoke CD audio signal.

Fig. 8 is an MPEG audio format in accordance with this  
invention.

\*Description on symbols for key parts of the drawings

1. First demodulation part    2. Second demodulation part    9. CPU  
10, 11. Memories    12, 13. Decoder    14. Video presentation part  
17, 18. D/A converter    19. Control part    20. MPEG decoder part  
21. Demultiplexer    22, 23. Audio presentation part    24. Switch

## 3. PREFERRED DESCRIPTION OF THE INVENTION

This invention relates to a CD system, more particularly to karaoke CD format and device for controlling audio signal utilizing the same which provides an user with selective reproduction of voice of a player.

As shown in Fig. 1, a general disc data layout of a karaoke CD includes lead in/lead out areas 1 and 6 formed at the lead in and lead out of the CD for encoding CD-RDMXA data containing empty sectors of mode2/form 2 therein, and program areas.

The program areas includes a volume descriptor area 2 formed next to the lead in area 1 containing path name of CDI application program described in compact disc bridge system description, a basic data area 3 for recording title of a song, name of the singer, and the songwriter, CD-I application program area 4 for recording an application program required for converting into bridge which facilitates a disc of this standard operated in CD-RTOS (Real Time Os) in a CD-I/FMV player, and an MPEG data area 5 for recording MPEG (Moving Picture Experts Group) video and audio data.

Herein, the lead in area 1 has records of number of songs, period of time of each song and total period of time, and lead in part and index part of each song, and the lead out area 6 has record of end of the program.

As shown in Fig. 2, a conventional karaoke CD system includes a first demodulation part 7 for demodulating EFM (Eight to Fourteen Modulation) signal, a second modulation part 8 for demodulating sector interleave for a CD-ROM on receiving signal

from the first demodulation part 7, a CPU 9 for demultiplexing system flow on receiving signal from the second demodulation part 8, a first, and second memories 10, 11 for storing video and audio data received from the CPU 9, an MPEG video decoder 12 and an MPEG audio decoder 13 for decoding MPEG video signal and MPEG audio signal of the video and the audio data stored in the first and the second memories 17 and 18 respectively, a STC(System Time Clock)for clocking system time under the control of the CPU 9, and a control part 10 for controlling all the first and the second demodulation part 7 and 8 and the MPEG decoding part 20 according to key signal applied thereto and applying a signal converted to D/A by D/A converters 14 and 15, to a buffer and a speaker.

The interleaving of a conventional MPEG video and MPEG audio sectors is as shown in Fig. 3. Shown in table 1 is audio channel encoding, which is to be explained in detail hereinafter.

Table 1 Audio Channel Encoding

	Stereo Music Program	Special Music Program
CH0	Left	mono without vocal
CH1	Right	mono with vocal

The karaoke CD format includes a stereo music program having left audio channel for encoding on MPEG audio channel 0 and right audio channel for encoding on MPEG audio channel 1, and special music program having one channel for encoding on music without vocal and the other channel for encoding on music with vocal.

Operation of the foregoing conventional karaoke CD system is to be explained hereinafter.

The karaoke-CD format which is read through a pick-up, is EFM demodulated and has CD errors corrected by the first demodulation part 1 that is EFM decoder. And then, the data is applied to the second demodulation part 2 that is a CD-ROM decoder, to demodulate the data interleaved at encoding, and is divided into audio data and video data under the demultiplexing operation of the CPU 9 to be applied to the MPEG video decoder 12 and the MPEG audio decoder 13.

The MPEG video decoder 12 and the MPEG audio decoder 13, restoring the compressed data, compares the STC from the STC part 16 to the PTS in the data to control presentation time of the data.

However, such a conventional karaoke-CD system has a disadvantage of being unable to obtain stereophony sound in case music without vocal and music with vocal of a special music program is carried on the first channel (Left) and the second channel (Right).

The object of this invention is to provide a user with selective reproduction of playing sound, i.e., voice (song of a singer) and accompaniment sound.

This invention is to explained in detail hereinafter, referring to the attached drawings.

An interleaving of MPEG audio/video sectors and a subheader in accordance with this invention are shown in Fig. 4 and 5,

respectively. To distinguish audio data Aa containing player's voice and accompaniment sound, and audio data Ab only containing accompaniment data in a subheader information in an audio packet, the subheader includes coding information encoded therein with distinguishing value applied thereto.

Herein, the coding information is, included into a subheader of each sector at data encoding as a distinguishing value, standardized as 0FH in case of MPEG video, and 7FH in case of MPEG audio, wherein new coding information (for example 3F) is added to use for a distinguishing signal for the audio data sector Aa having both playing sound and accompaniment sound and the audio data sector Ab only having accompaniment sound.

Interleaving of MPEG video and MPEG audio sectors is as shown in Fig. 4. That is, the interleaving of video data and audio data sectors, in general has 4 to 5 consecutive video sectors V with one audio sector A added thereto, and can transmit decoded data distinguished by selecting signal applied thereto added with a sector containing voice at encoding Aa and Ab.

Herein, since the increase of buffer size due to the newly added audio sectors Aa and Ab is infinitesimal compared to the image data, it can be ignored.

Fig. 6 shows a device for controlling a karaoke CD audio signal in accordance with this invention in a interleaving state of an audio data and a video data.

The device includes a first demodulator 7 for correcting errors of EFM signal read through pick up, demodulating the

corrected signal, and applying the demodulated signal, and a second demodulator 8 for demodulating sector interleave for a CD-ROM from the signal received from the first demodulator 7, a CPU 9 for separating audio and video data and time data from the signal received from the second demodulator 8, a first memory and a second memory 10, 11 for storing the audio and video data received from the CPU 9, and MPEG audio decoder 12 and MPEG video decoder 13 for decoding the MPEG audio data stored in the memory 10 and the MPEG video data stored in the memory 11, a STC 16 for generating synchronizing signal using time information received from the CPU 9, a video presentation part 14 for comparing the PTS in the data to the signal received from the STC 16, and applying the corresponding data, an audio demultiplexer 21 for dividing an audio signal received from the MPEG audio decoder ~~13~~<sup>12</sup> by the signal of the STC 16 into an audio data Ab only corresponding to accompaniment sound, and an audio data Aa corresponding to accompaniment sound and playing sound, a first audio presentation part 22 for comparing the PTS in the data corresponding to accompaniment sound received from the audio demultiplexer 21 to the signal received from the STC 16, a second audio presentation part 23 for comparing the PTS in the data corresponding to accompaniment sound and playing sound received from the audio demultiplexer 21 to the signal received from the STC 16, a control part 19 for controlling each part by key matrix, a switch 24 for selecting one of the data received from the first and the second audio presentation parts 22 and 23 under



the control of the control part 19 and a first D/A converter 17 and a second D/A converter 18 for converting the data received from the video presentation part 14 and the switch 24.

Operation of the device in accordance with this invention as described above is to be explained hereinafter.

Fig. 7 shows an operation order of this invention, the encoded karaoke-CD data having coding information applied thereto added with distinguishing value has EFM demodulated through the first demodulation part 1 which is a EFM/CIRC(Cross Interleave Read Solomon Code) and errors of CD corrected, has the interleaved data at encoding demodulated through the second demodulation part 1 which is a CD-ROM decoder, and is separated into audio and video data in the CPU 9.

In this instant, of the audio data, the demultiplexing signal coming in at reading in the coding information is applied to the audio demultiplexer 21 for operation of the audio demultiplexer 21.

And, the audio demultiplexed data restore the compressed data through the MPEG video decoder 12 and the MPEG audio decoder 13. The applied data is controlled by comparing the PTS in the data to the signal received from the STC 16 and divided into the video presentation part 14 and the audio demultiplexer 21 under the signal of the CPU 9.

That is, when an audio data(Ab) only corresponding to accompaniment sound of an audio signal is applied, the audio demultiplexing signal received from the CPU 9 is compared to the

PTS, and applied by switching operation of the switch 24. When an audio data(Aa) corresponding to accompaniment sound and player's voice of an audio signal is applied, the audio demultiplexing signal received from the CPU 9 is compared to the PTS, and applied by switching operation of the switch 24.

The audio signal from the switch 24 and the video signal from the video presentation part 14 are converted by the first and second D/A converters and provides a player's voice and an image, respectively.

At this time, the switch 24 operates under the control of the controller 19 according to the key signal.

The MPEG audio format, as shown in Fig. 8, generates MPEG audio, MPEG video demultiplexing signal and separated MPEG audio signals Aa and Ab by extracting coding information from subheaders of each sector, and by reading the packet header and comparing to STC, the presentation time of the data can be controlled.

As described above, this invention for karaoke CD system can make people enjoy the mood of karaoke by reproducing audio data containing player's voice, i.e., playing sound and accompaniment sound, and audio data containing accompaniment sound selectively, which permits enjoy stereophony sound corresponding to CD sound and subsequently makes people exercise singing merrily.

#### 4. WHAT IS CLAIMED IS:

1. A karaoke CD format comprising a CD format divided into video sectors and audio sectors, said audio sectors are further divided into a part Aa for recording accompaniment sound and playing sound on the same and the other part Ab for recording accompaniment sound only, and provided to record coding information for distinguishing them.

2. A device for controlling audio signal using CD format comprising:

a first demodulator 7 for correcting errors of EFM signal read through pick up, demodulating the corrected signal, and applying the demodulated signal,

a second demodulator 8 for demodulating sector interleave for a CD-ROM from the signal received from the first demodulator 7,

a CPU 9 for separating audio and video data and time data from the signal received from the second demodulator 8,

a first memory and a second memory 10, 11 for storing the audio and video data received from the CPU 9,

MPEG audio decoder 12 and MPEG video decoder 13 for decoding the MPEG audio data stored in the memory 10 and the MPEG video data stored in the memory 11,

a STC 16 for generating synchronizing signal using time information received from the CPU 9,

a video presentation part 14 for comparing the PTS in the data to the signal received from the STC 16, and applying the corresponding data,

an audio demultiplexer 21 for dividing an audio signal received from the MPEG audio decoder 13 by the signal of the STC 16 into an audio data Ab only corresponding to accompaniment sound, and an audio data Aa corresponding to accompaniment sound and playing sound,

a first audio presentation part 22 for comparing the PTS in the data corresponding to accompaniment sound received from the audio demultiplexer 21 to the signal received from the STC 16,

a second audio presentation part 23 for comparing the PTS in the data corresponding to accompaniment sound and playing sound received from the audio demultiplexer 21 to the signal received from the STC 16,

a control part 19 for controlling each part by key matrix, and,

a switch 24 for selecting one of the data received from the first and the second audio presentation parts 22 and 23 under the control of the control part 19.

## ABSTRACT

This invention relates to a karaoke CD format and a device for controlling audio signal utilizing the karaoke CD format which provides a user with selective reproduction of voice of a player. This invention includes a first demodulator 7 demodulating EFM signal read from CD format comprising a CD format divided into video sectors and audio sectors, said audio sectors are further divided into a part Aa for recording accompaniment sound and playing sound on the same and the other part Ab for recording accompaniment sound only, and provided to record coding information for distinguishing them, a second demodulator 8 for demodulating sector interleave for a CD-ROM from the signal received from the first demodulator 7, a CPU 9 for separating audio and video data and time data from the signal received from the second demodulator 8, a first memory and a second memory 10, 11 for storing the audio and video data received from the CPU 9, MPEG audio decoder 12 and MPEG video decoder 13 for decoding the MPEG audio data stored in the memory 10 and the MPEG video data stored in the memory 11, a STC 16 for generating synchronizing signal using time information received from the CPU 9, a video presentation part 14 for comparing the PTS in the data to the signal received from the STC 16, and applying the corresponding data, an audio demultiplexer 21 for dividing an audio signal received from the MPEG audio decoder 13 by the signal of the STC 16 into an audio data Ab only corresponding to accompaniment sound, and an audio data Aa

corresponding to accompaniment sound and playing sound, a first audio presentation part 22 for comparing the PTS in the data corresponding to accompaniment sound received from the audio demultiplexer 21 to the signal received from the STC 16, a second audio presentation part 23 for comparing the PTS in the data corresponding to accompaniment sound and playing sound received from the audio demultiplexer 21 to the signal received from the STC 16, a control part 19 for controlling each part by key matrix, and, a switch 24 for selecting one of the data received from the first and the second audio presentation parts 22 and 23 under the control of the control part 19.